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## Transcriptome Analysis of Neural Progenitor Cells by a Genetic Dual Reporter Strategy.

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### Public Summary:

Global analysis of stem/progenitor cells promises new insight into mechanisms that govern self-renewal and cellular potential, an unresolved question of stem/progenitor cell biology. Despite rapid advance of genome-wide profiling methods, the difficulty in cell purification remains a major challenge for global analysis of somatic stem/progenitor cells. Genetic tagging with a reporter provides a powerful tool for identification and isolation of a specific mature cell type, however, for stem/progenitor cells, reporter retention by progeny may be a concern for impurity. Here we describe a genetic system combining a progenitor cell specific label with a second tag for marking differentiation. We present evidence that differential labeling of neural progenitor cells and their progeny enables prospective purification of these two cell types, whereas isolation based on a single marker compromises the purity of the intended progenitor population. Comparative expression profiling between the purified progenitors and progeny documents a neural progenitor cell transcriptome and uncovers an important role of TAM receptor tyrosine kinases in the maintenance of neural progenitor cells. This study establishes a general strategy for isolation of somatic stem/progenitor cells and provides a transcriptome database of neural progenitor cells useful for identification of causal factors of neural progenitor cell state, global dissection of epigenetic control of cellular potential, as well as for developing biomarkers or targets of brain cancer stem/initiating cells for therapeutic interventions.

### Scientific Abstract:

Global analysis of stem/progenitor cells promises new insight into mechanisms that govern self-renewal and cellular potential, an unresolved question of stem/progenitor cell biology. Despite rapid advance of genome-wide profiling methods, the difficulty in cell purification remains a major challenge for global analysis of somatic stem/progenitor cells. Genetic tagging with a reporter provides a powerful tool for identification and isolation of a specific mature cell type, however, for stem/progenitor cells, reporter retention by progeny may be a concern for impurity. Here we describe a genetic system combining a progenitor cell specific label with a second tag for marking differentiation. We present evidence that differential labeling of neural progenitor cells and their progeny enables prospective purification of these two cell types, whereas isolation based on a single marker compromises the purity of the intended progenitor population. Comparative expression profiling between the purified progenitors and progeny documents a neural progenitor cell transcriptome and uncovers an important role of TAM receptor tyrosine kinases in the maintenance of neural progenitor cells. This study establishes a general strategy for isolation of somatic stem/progenitor cells and provides a transcriptome database of neural progenitor cells useful for identification of causal factors of neural progenitor cell state, global dissection of epigenetic control of cellular potential, as well as for developing biomarkers or targets of brain cancer stem/initiating cells for therapeutic interventions.

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